Progress Energy

NOV 19 2007

Serial: HNP-07-163
10 CFR 50.73

U.S. Nuclear Regulatory Commission
ATTN: NRC Document Control Desk
Washington, DC 20555

SHEARON HARRIS NUCLEAR POWER PLANT UNIT 1
DOCKET NO. 50-400/LICENSE NO. NPF-63
LICENSEE EVENT REPORT 2007-003-00

Ladies and Gentlemen:

The enclosed Licensee Event Report 2007-003-00 is submitted in accordance with 10 CFR 50.73. This report describes an automatic reactor/turbine trip following actuation of a sudden pressure relay and loss of the "1A" Startup Transformer. Event notification EN# 43676 previously reported this event on September 29, 2007 in accordance with 10 CFR 50.72.

Please refer any questions regarding this submittal to Mr. Dave Corlett, Supervisor - Licensing/Regulatory Programs, at (919) 362-3137.

Sincerely,

Kelvin Henderson
Plant General Manager
Harris Nuclear Plant

KH/khv

Enclosure

cc: Mr. P. B. O'Bryan, NRC Sr. Resident Inspector
Ms. M. G. Vaaler, NRC Project Manager
Dr. W. D. Travers, NRC Regional Administrator

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NRC FORM 366 (9-2007) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 08/31/2010

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
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4. TITLE

Automatic Reactor Trip following Actuation of a Sudden Pressure Relay and Lockout of the 1A Startup Transformer (SUT)

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									N/A	05000
09	28	2007	2007	- 003 -	00	11	19	2007	FACILITY NAME: N/A	DOCKET NUMBER: 05000

9. OPERATING MODE

1

10. POWER LEVEL

027

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☐ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☒ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Kelli Voelsing – Licensing Specialist	919-362-3057

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	EA	XFMR	GE	Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

At 22:32 on September 28, 2007, while reducing power for Refueling Outage (RFO) 14, a fault pressure trip on "1A" Startup Transformer (SUT) caused a reactor trip/turbine trip with a loss of all Reactor Coolant Pumps (RCP) and a subsequent Auxiliary Feedwater (AFW) actuation. There was no inoperable equipment at the start of this event that contributed to this event. Safety systems functioned as required and operators responded in accordance with approved procedures.

Post trip discovery found that the data to determine the available margin to the "1A" SUT sudden pressure trip setpoint was not available at the time of the design and installation of the Qualitrol 930 series sudden pressure relays. Additionally, it was determined that that the relay was out of calibration in the more sensitive direction.

Completed corrective actions include replacing the Qualitrol 930 series relay with the Qualitrol 900 series relay and conducting testing to validate that the "1A" SUT was not damaged. Additional corrective actions are to use a temporary modification to gather data on the "1A" SUT to determine operating margin and implement appropriate design changes to the sudden pressure relays on the SUTs.

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NARRATIVE

Energy Industry Identification System (EIIS) codes are identified in the text within brackets [ ].

I. DESCRIPTION OF EVENT

At 22:32 on September 28, 2007, while reducing power for Refueling Outage (RFO)-14, a fault pressure trip on "1A" Startup Transformer (SUT) [EA] caused a reactor trip/turbine trip with a loss of all Reactor Coolant [AB] Pumps (RCP) and a subsequent Auxiliary Feedwater (AFW) [BA] actuation. There was no inoperable equipment at the start of this event that contributed to this event.

The plant was at approximately 27 percent power and was reducing power to begin RFO-14. All plant auxiliary loads had been transferred to the SUTs in accordance with plant procedures. "1A" SUT was supplying the "1A" and "1C" electrical buses. The "1A" SUT tripped due to the actuation of its Qualitrol 930 series sudden pressure fault relay. This deenergized the "1A" and "1C" buses causing a loss of the "A" and "C" RCPs. This condition, underfrequency on 2 of 3 RCP buses at less than 57.5 Hz, caused a reactor trip. The condition also tripped "B" RCP as designed, resulting in a loss of all forced flow in the reactor coolant system.

The AFW system actuated immediately following the reactor trip at 22:32 and operated as expected to stabilize steam generator levels. All systems functioned as required and no other safety systems were actuated. All control rods fully inserted on the reactor trip. The operations staff responded to the event in accordance with applicable plant procedures. The plant stabilized at normal operating no-load reactor coolant system temperature and pressure following the reactor trip.

This condition is being reported as an unplanned reactor protection system actuation and specified system actuation in accordance with 10 CFR 50.73(a)(2)(iv)(A).

II. CAUSE OF EVENT

The investigation found no evidence of an actual fault condition in the "1A" SUT. Post trip discovery revealed that 2 out of 3 channels on the 930 series pressure relay actuated causing a lockout of the "1A" SUT and the subsequent reactor trip. The investigation for this event determined that available margin for the low rate of rise pressure changes was not adequate. The HNP transformer internal pressure profile was likely near the limit for relay sensitivity when set at 4 (0.35 psig/sec for about 10 seconds) which resulted in two of the three channels actuating.

The cause of the available margin for low rate of rise pressure changes being inadequate was that the data to determine the available margin was not available at the time of the design. The basis for the range of the 930 relay was that it was designed to bound the old 900 series relay. There is no documentation available from the relay vendor or the original equipment manufacturer of the transformer on the original basis for the relay range. Data is not available on what pressure rates would be seen in the transformer during normal operation. During this investigation contact was made with original equipment manufacturers and with consultants in an attempt to determine what normal operating pressure rates would be seen by the relay sensors. The original equipment manufacturers and consultants stated that the information is not available and that they do not have the analytical tools to determine what rates of pressure change are expected. Therefore, it is concluded that data to determine the available margin was not available at the time of the design.

It was also determined that the 930 series fault pressure relay installed in the "1A" SUT was out of calibration in the more sensitive direction at the low pressure rate.

The potential narrow available margin, combined with the fact that the relay was out of calibration on the low pressure rate (.35 psig/sec) when the sensitivity was set at 4, were the causal factors that were in place that led to the event.

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NARRATIVE

III. SAFETY SIGNIFICANCE

This event is not significant because the Reactor Protection System [JC] functioned as designed. This event is noteworthy because a single component malfunction caused a reactor and turbine trip.

Actual Safety Consequences:
The transient was an automatic reactor trip from 27 percent power generated by logic for a RCP Underfrequency due to a loss of Auxiliary buses 1A-NNS, 1C-NNS and 1D-NNS. Although only one train (fed from the 'A' Startup Transformer) of non-emergency power was lost, this event is bounded by a Loss of Non-emergency AC Power to the Station Auxiliaries which is analyzed in the HNP FSAR Section 15.2 . A Loss of Non-emergency AC Power to the Station Auxiliaries is classified as an American Nuclear Society (ANS) Condition II event – a fault of moderate frequency. The plant is designed for this type of event and responded as expected. The initial plant conditions prior to the trip were well within the bounding conditions for the plant design. The plant attained normal operating no-load temperature and pressure, and no unusual conditions were observed for plant equipment following the event. All safety equipment functioned as required. The 'A' EDG started and loaded the 'A' safety buses (as designed). No additional or compensatory measures were required for this event. The operating staff performed the required actions for the trip. Other than the transient induced by the trip, there are no adverse safety consequences.

Potential Safety Consequences:
The potential safety consequences under alternate conditions are bounded by the FSAR Chapter 15 events.

IV. PREVIOUS SIMILAR EVENTS

The Qualitrol 930 two-out-of-three sudden pressure relay misoperation experienced at Harris is a first of a kind event in the industry for this model relay.

V. CORRECTIVE ACTIONS

Completed corrective actions include replacing the Qualitrol 930 series relay with the Qualitrol 900 series relay and conducting testing to validate that the "1A" SUT was not damaged. Additional corrective actions are to use a temporary modification to gather data on the "1A" SUT to determine operating margin and implement appropriate design changes to the sudden pressure relays on the SUTs.

VI. COMMITMENTS

This document contains no new regulatory commitments.